





# Self-Sealing /Self-Healing Waste Containment System

*"The ability of WTI's waste containment barrier to repair itself in the event of a breach provides a unique advantage in the marketplace. We are firmly committed to full-scale commercialization of this innovative technology."*

Herb Campbell  
Vice President  
Water Technology International Corp.  
Burlington, Ontario

## THE COMPANY

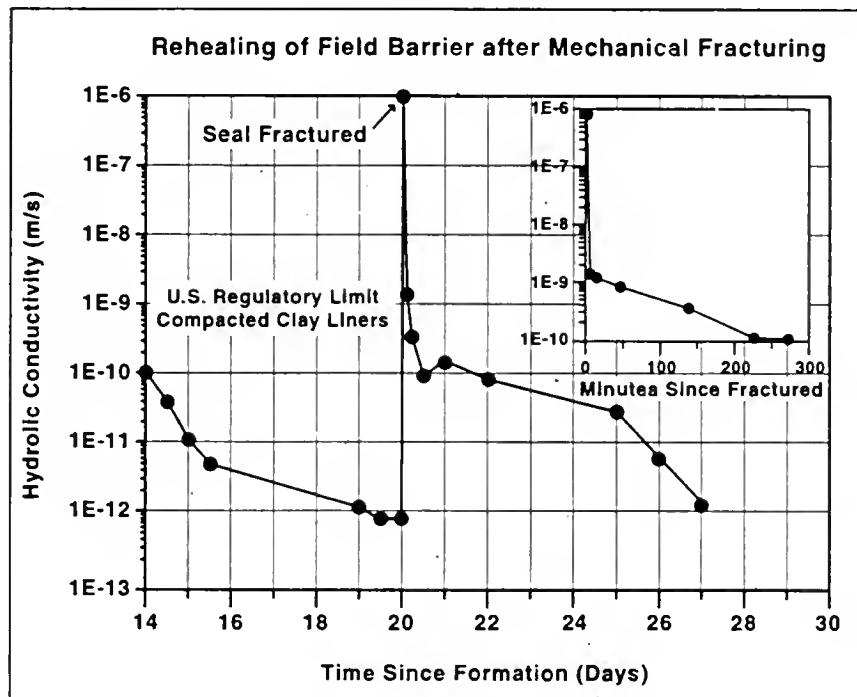
Water Technology International Corp. (WTI) is an employee-owned company with more than 25 years of experience in providing environmental technologies and services in five business units: pollution prevention, pollution control, site remediation, residue management and environmental chemistry. As operator of the Wastewater Technology Centre (WTC) and the Canadian Clean Technology Centre, WTI has the people, facilities and equipment to provide cost-effective solutions to environmental problems.

## THE CHALLENGE

Conventional barrier systems, such as compacted clay, flexible membranes and geosynthetic clay liners differ in the type of leakage protection they provide when used in waste containment applications, either as liners or as cover systems. However, they all share the serious disadvantage that breaches cannot be repaired without excavation and reconstruction at enormous expense. The novel barrier system developed by researchers at WTI has excellent performance characteristics and is chemically reactive so that it repairs itself when breached.

## TECHNOLOGY DESCRIPTION

The Self-Sealing / Self-Healing Barrier concept functions on the principle that two reactive materials placed in layers will react where they



meet to form an insoluble precipitate. This precipitate constitutes a seamless impermeable seal which will prevent transmission of leachate and contaminants. The primary advantage of this system is that any disruption of the impermeable seal will lead to new contact of the two reactive layers and renewed formation of the insoluble precipitate.

The Self-Sealing / Self-Healing Barrier is intended for use either as a liner or as a cover for waste landfills, contaminated sites, secondary containment areas, etc. in the industrial, chemical, mining and municipal sectors and also as a barrier to the flow of liquids for the transportation and construction industry.

Water Technology International Corporation has the sole right licence from Environment Canada to develop and commercialize the patented Self-Sealing / Self-Healing Barrier system for containment of wastes which is jointly owned by Environment Canada and the Netherlands Energy Research Foundation.

## RESULTS

While the Self-Sealing / Self-Healing Barrier concept will function with a variety of reactive materials, one of the most promising developments has been a customized barrier for the mining industry. The estimated cost for typical barrier applications as a cover to prevent oxidation of mining wastes and the consequent formation of acid mine drainage is approximately one-third that of conventional cover technologies. Self-Sealing / Self-Healing

Barriers for mining wastes consistently meet or exceed the recommended rate at which liquid or leachate flows through, required by the United States Environmental Protection Agency for soil liners used in landfills and hazardous waste sites. The shear strength of the barrier is high and the barrier has been shown to heal fractures and reheat weathering damage rapidly and effectively.

Currently, under a working agreement with Falconbridge Ltd., a 100 m<sup>2</sup>

field test plot of the Self-Sealing / Self-Healing Barrier has been placed as a cover to prevent oxidation of underlying sulphidic mine tailings. Oxygen, carbon dioxide and tracer profiles with depth are being monitored. Profiles show dramatically reduced oxygen levels under the barrier as compared with unsealed tailings.

## TECHNOLOGY OPPORTUNITIES

The Self-Sealing / Self-Healing Barrier has been shown to be equal or superior to conventional liner and cover technologies in its ability to prevent diffusion of gases, flow of leachate and transmission of heavy metals. Its unique ability to heal itself when breached and its low cost are important competitive advantages in the marketplace.

Water Technology International Corporation is seeking to develop working relationships with companies interested in either:

- 1) field application of the Self-Sealing / Self-Healing Barrier technology developed for mining wastes; or
- 2) development of other customized Self-Sealing / Self-Healing Barrier formulations for specific waste management scenarios.

## PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The development and demonstration of this technology was partially supported by the Ontario Ministry of the Environment, and Environment Canada under the Development and Demonstration of Site Remediation Technologies program.

Industrial companies located in Ontario may seek ministry/industry services which will help them to:

- \* reduce, reuse and recycle solid waste;
- \* clean up historic pollution effectively and destroy hazardous contaminants;
- \* reduce or eliminate liquid effluent and gaseous emissions
- \* use energy and water more efficiently.

Equipment and service supply companies can benefit from the information provided on technologies identified for business development.

## FOR FURTHER INFORMATION, PLEASE CONTACT:

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## MINISTRY OF THE ENVIRONMENT SERVICES

For information on Ministry of the Environment assistance to industry, please contact the Industry Conservation Branch at (416) 327-1492, Fax (416) 327-1261

For more project profiles and other publications, visit the ministry's website at <http://www.ene.gov.on.ca>

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